A STUDY OF SIX SIGMA METHODOLOGY IN MULTI-SPECIALTY HOSPITALS IN MARATHWADA REGION OF MAHARASHTRA STATE

"It is not enough to do your best, you must know what to do, and then do your best."

W. Edwards Deming

1. Introduction

The hospital, a major social organization, offers considerable advantages to both the patient and the society. Certain health problems require intensive medical treatment and personal care which normally cannot be made available at home or in the clinic of a doctor, this is possible only in a hospital where a large number of professionally and technically skilled people apply their knowledge and skill with the help of world class advanced and sophisticated equipment. The first and foremost function of a hospital is to give proper care to the sick and injured without any social, economic or racial discrimination.

In a developing country like India, the health care expenses are mostly out of pocket expenditures; healthcare consumer pays each and every penny for the services rendered. The patients search for the best available services and pay the affordable cost.

In health care industry patients are considered as customers. So keeping customer satisfied is high priority in health care industry. Nowadays patients have lots of choices between different health care providers. So quality has become very important in health care industry. Health care industry is different from manufacturing industry. But still there is lot of similarities. If an organization wants to develop a machine or give good treatment to patients, it has to develop good processes. Waste of money, resources, time, supplies, or good will decreases value in every sector which ultimately dissatisfies the customers. This can be eliminated by using Six Sigma into Health Care industry.

1.1 Health Services in Maharashtra

Maharashtra is the most affluent state in the country with the highest per capita income, and contributes over 15% of the country's national income and 40% of the tax revenues, it continues to have high levels of poverty and inequalities which get reflected in health outcomes which are not the best in the country. Thus Maharashtra has to still

fight with malnutrition deaths, child mortality and maternal mortality levels not commensurate with its economic position in the country, declining child sex-ratios, low and declining levels of public health spending and investments, high levels of vacant positions of doctors at PHCs and CHCs, and low levels of access to various health services like antenatal care, complete child immunization, institutional deliveries etc. Thus it is becoming apparent that if Maharashtra wants to retain its position of lead, the government must address the needs of other parts of the State too such as Marathwada, Khandesh etc.

Now days in Maharashtra, apart from public health care units and semi-government units there are Multi-specialty hospitals (MSHs) also who can play an important in delivering the care to the patients. As people are ready to spend money to get a reliable treatment from the MSHs, it is MSHs who have to be very good at quality in healthcare aspect.

1.2 Research Background

Hospitals that are applying six sigma activities also need an objective measurement of the effects of the six sigma management activities on their corporate competitiveness and self-improvement. However, in order to accomplish these goals it will be necessary to develop factors that can empirically verify six sigma management activities and create a systematic research model of how those factors affect corporate competitiveness and self-improvement. The important CSFs for this study are measured by five elements, namely, Leadership, Employee involvement, Continuous improvement, Training and development and Customer satisfaction.

1.3 Six Sigma Methodology

Six Sigma is a methodology, a statistical analysis tool and a management system designed to streamline business processes by eradicating defects. Six Sigma evaluates the capability of a process to perform almost defect-free, where a defect is defined as anything that results in customer dissatisfaction. Six Sigma is focused on defects per million opportunities. Six Sigma is based on a quality statistic that equates to **3.4 defects per million** opportunities. This is the target level of performance for a process. This will discuss it further in Literature review section.

1.4 Problems

The failures were attributed to lack of leadership, lack of communication, and lack of education of the SS philosophies. The organizations that had commitment of SS strategies saw improvements in eliminating waste by redesigning workflows and improvements in the quality of the products.

The six sigma will help to identify root causes of processes that can be improved with standardization. Six Sigma focuses on improving the customer experience and satisfaction by addressing processes that affect the value of the product delivered. The usage of these strategies for transitions of care in a healthcare setting can help optimize outcomes and patient experience. This study may encourage hospital leaders to involve front-line employees in using Lean-Six-Sigma techniques as a means for improvements. The researcher will try to develop a conceptual model which will explain the influencing factors and its impact on six sigma implementation. There are various factors which affect six sigma but the researcher will take five factors such as Leadership, Employee involvement, Continuous improvement, Training and development and Customer satisfaction.

2. Introduction to proposed research topic

Poor hospital throughput causes poor quality of care and service to the patients. Lean and Six Sigma have been shown to improve processes and workflows particularly when combined. Commitment from senior leaders that make the Lean and Six Sigma part of the operational plan have obtained and sustained results.

The researcher will try to find out the critical success factors which are responsible to improve the quality of multi-specialty hospitals n Marathwada region of Maharashtra.
The purpose of this study is to identify the effects Six Sigma methods on patient satisfaction scores for individuals transitioning between levels of care. There are some common factors for failure, such as a lack of top management commitment and involvement, lack of communication, lack of training and education, limited resources and others. Many gaps and limitations are discussed in this study.

3. Survey or review of literature and development in the relevant subject

3.1 Six Sigma

Healthcare organizations strive for zero defects because a defect causes a patient additional pain and suffering and could result in death. “The key is not the number of errors, but having a systematic process to identify the sources of errors and drive them down” (Young, 2004, p163). Hospitals that are starting to improve throughput metrics utilizing Lean will have substantial performance improvements. However, they will not obtain national benchmarks by using Lean only. Lean is typically partnered with Six Sigma, a data-driven approach.

Relationship between Influencing factors on Six Sigma Implementation in the Multi-specialty hospitals:

3.2 Leadership

Six sigma is a concept that is easily understood and embraced by the healthcare team because they can see immediate results. Six Sigma is more complex and requires the healthcare team to understand mathematical theories. When senior leaders drop out of sight they unintentionally imply the plan is not worthy of their attention and not important (Zuckerman, 2012). Albliwi (2014) pointed out Lean Six Sigma initiatives fail without proper leadership and communication. Top management leadership to promote the policy/system and financial compensation for members are included as the main factors in this concept (Benson et al., 1991; Joseph et al., 1999; Hackman & Wageman, 1995; Blakeslee, 1999; Rowlands, 2003; Heuring, 2004; Hahn et al., 1999; Saraph et al., 1989).

3.3 Employee Involvement

If business leaders fail to engage employees when implementing lean management will cause the program to fail (Ferdow & Netland, 2014; Liker & Morgan, 2011). The three constituencies affected by Six Sigma activities are the customers, shareholders, and employees (Pyzdek, & Keller, 2014). The customer’s input and determination of customer value is the core principle of Six Sigma; however, to successfully implement its practice the employees need to be engaged. A method to

engage physicians with Six Sigma is the focus of how Six Sigma not only aims to improve processes for patient or customer satisfaction, but also improvement of daily work processes can help alleviate stress and improve operational efficiency for employees. Mackinney (2015).

3.4 Continuous improvement

When translated to the healthcare environment, process improvement of day-to-day activities at all levels within the organization would optimize the processes that currently comprises healthcare (Jimmerson, 2009). Gerard et al. (2010) explained the importance of creating a culture of continuous improvement in healthcare organizations is important. Literature within the last decade has shown that privatized hospital environments utilized programs such as Lean and Six-sigma revealed improvements in quality, efficiencies, and cost problems in healthcare (De la Lama et al.,2013; Niemeijer et al., 2013; Xie & Peng, 2012; Mohebbifar et al., 2014). Continuous improvement methodologies evolved from traditional manufacturing to hybrid methodologies focused on all aspects of the organization (Bhyiyan, Baghel, Wilson, 2006).

3.5 Training & development

Previous studies (e.g., Heckl *et al.*, 2010; Chakrabarty and Tan, 2009; Coronado and Antony, 2002; Antony *et al.*, 2000; Henderson and Evans, 2000) have found a positive relationship between training and education, and the Six Sigma implementation. In this instance, we expect that training and education will be positively related to the Six Sigma implementation. Provision of training and education is important to the success of Six Sigma implementation (Coronado and Antony, 2002).

3.6 Customer satisfaction

When using TQM, business leaders emphasize customer satisfaction in terms of customer requirements and they seek zero defects via continuous improvement (Näslund, 2008). In addition, statistical process control Six Sigma focuses on improving the customer experience and satisfaction by addressing processes that affect the value of the product delivered. A shift of focus on patient satisfaction or experience in the new healthcare environment is needed by all healthcare entities (Lauer, 2015). By reducing wait times and focusing a delivering service timely, improved satisfaction will occur because patients will be able to spend more time with their healthcare provider.

4. Objectives of the research and proposed hypothesis

1. To examine the various factors affecting the implementation of Six Sigma Methodology in multi-speciality hospitals in the Marathwada region of Maharashtra state.
2. To identify the latent variation in hospitals incurred by the influencing factors by applying the of Six Sigma Methodology in the Marathwada region of Maharashtra state.
3. To observe the factors creating waste in multi-specialty hospitals.
4. To determine the significance level of six sigma methodology in multi-speciality hospitals.
5. To understand the operational dimensions of Six Sigma Methodology.
6. To suggest a strategic approach for the improvement of management practices by using of Six Sigma Methodology.

4.1 Proposed hypothesis

1. **Hypothesis H1:** There is a positive relationship between Leadership and Employee Involvement and also with Continuous improvement while implementing six sigma methodology.
2. **Hypothesis H2:** There will be a positive relationship between Leadership and training & development while implementing six sigma methodology.
3. **Hypothesis H3:** There is a positive relationship between Employee Involvement & Continuous improvement along with customer satisfaction while implementing six sigma methodology.
4. **Hypothesis H4:** There will be a positive relationship between Continuous improvements with customer satisfaction while implementing six sigma methodology.
5. **Hypothesis H5:** There will be a positive relationship between training & development with Continuous improvement and also with customer satisfaction while implementing six sigma methodology.

5. Methodology to be used and adopted

5.1 Research Methodology

The researcher will use **Quantitative and Descriptive Research Methodology** which focused on getting the information about six sigma influencing factors from the customers (internal as well as external-i.e. employees & patients respectively).

5.1.1 Independent variables

In the study, influencing factors will be (i.e., Leadership, Employee involvement, Continuous improvement, Training and development and Customer satisfaction.) is scored on a five-point scale. Likert Scale will be used to measure the independent variables.

5.1.2 Dependent variables

Six sigma self will be the dependant variable.

5.2 Sampling Technique

The Multi-specialty hospitals in Marahwada region of Maharashtra will be select as Universe. Out which the researcher will select the population of multi-specialty by **Simple Random Sampling.**

5.3 Data Collection Technique

The researcher will use methods of data collection:

5.3.1 Primary data collection

5.3.2 Secondary data collection

5.3.1 Primary data collection

There are near about 4800 hospitals which are present inside Marathawada. Out of which 312 are multi-specialty hospitals. They are distributed among 8 districts of Marathawada as following:

Sr. No.	Name of the District	No. Of Multi-specialty Hospitals	Proposed Sample Size for Study
1	Aurangabad	119	50 (42.01%)
2	Beed	40	20 (50%)
3	Hingoli	09	5 (55.55%)
4	Jalana	23	10 43.47%)
5	Latur	52	25 (48.07%)
6	Nanded	35	20 (57.14%)
7	Osmanabad	19	10 (52.63%)
8	Parbhani	15	8 (53.33%)
			Average (50.27%)/

Source: The hospital directory, 2016, Data.gov.in

Out of these hospitals the researcher would like to take nearly 150 multi-specialty hospitals as a sample. As there are some limitations to this study, those will be discussed under separately in this chapter.

Customer opinions will be collected by documents and multiple data gathering methods **(Interviews, and Questionnaires)**.

The respondents for this study will be the Leaders or Owners, Employees (e.g., head of department, senior executives, executives and others) working in MSHs and the Patients i.e. Customers of these MSHs. The survey instrument will be administered personally and the respondents would be given sufficient time to complete the questionnaire. Each individual will be informed of the purpose of the questionnaire and will be assured of confidentiality of the responses. Respondents will be encourage to give constructive suggestions on the last page of the survey instrument if they willing to do so.

Apart from which the researcher will also use:

Original documents (on-site/of-site) from the multi-specialty hospitals-if any

Various departmental Records of various the multi-specialty hospitals

The Pre-tested record and observations

5.3.2 Secondary data collection

The researcher will use and go through various Books, Journals, Magazines, Websites, Published reports etc. as a tools of data collection.

5.4 Data Analysis

5.4.1 Statistical Tools

The methodology used will be **Structural Equation Modelling** for statistical analysis with the help of SPSS software & other relevant techniques.

The researcher will try to use the following tools for data analysis:

i. Exploratory Factor Analysis
ii. Confirmatory Factor Analysis
iii. Reliability Testing
iv. Validity Testing
v. Probability Distribution Curve
vi. Chi-Square Test
vii. Calculation of P-Value
viii. ANOVA
ix. Correlation analysis
x. Regression Analysis

5.5 Limitations of the Study

1. It will be the possibility that some multi-specialty hospitals would resist to share their information.
2. The hospital count will vary as this count would be gathered from various sources such as hospital directory, websites, etc.

Though the number of patient visits are not fixed in hospitals, the count of patients would be vary in each multi-specialty hospital.

6) Importance of the study-

i. Variation causes bottlenecks because staff will make up the rules as they go along. Variation can be managed by having protocols in place to prevent bottlenecks. By encouraging "good" practices, health professionals can accomplish zero defects or no deviation in the processes.

ii. Although it annihilates the causes of errors and minimizes the variability of production process, it might be an important tool that provides improvements in the procedures. Thus, by developing the right tools, techniques and management practices, firms can increase not only customer satisfaction, but also their financial outputs.

iii. The six sigma quality policy can overcome the failure of the Total Quality Management, intending to significantly improve the efficiency and the effectiveness of an organization, providing overall operational excellence and perfection.

iv. As in the context of Indian scenario, six sigma is very essential because this methodology has the capacity to eliminate the process variation & increase the hospital efficiency in terms of reducing cost, unnecessary work, transportation cost, waiting time etc. and ultimately to satisfy the customers.

7) Proposed work plan- with a tentative chapter scheme

Chapter 1- Introduction

1.1 Introduction to Quality in Healthcare of (Marathwada) Maharashtra State

1.2 Research Background

1.3 Introduction to Six Sigma Methodology

1.4 Six Sigma in Healthcare Services

Chapter 2- Review of Literature

Chapter 3- Research Methodology
3.1 Research Problem
3.2 Scope of the Study
3.3 Use of Study
3.4 Limitations of Study
3.5 Objectives of Study
3.6 Hypothesis
3.7 Concept Clarification
Chapter 4- Data Collection
4.1 Research Design
4.2 Sampling Technique
4.2.1 Primary Data
4.2.2 Secondary Data
Chapter 5- Data Analysis
5.1 Statistical Tools
5.2 Interpretation of Data
Chapter 6- Conclusions & Suggestions

8) Year wise plan of work and targets to be achieved

First Six months of research work: Literature Review, Hypothesis development, theoretical framework, identification research problems, and objectives

Second Six months of research work: Questionnaire designing, pilot survey,

Third Six months of research work: Data collection, Data analysis

Fourth Six months of research work: Data analysis, report writing,

Fifth Six Months of research work: Findings, discussions, and conclusion, Pre-viva Preparation

9) Expected outcome

The proposed model in this study will provide the concrete objective that organizational managers must be attentive when practicing Six Sigma. It is important that top management will provide full support to Six Sigma implementation, and allocate sufficient budget and resources for continuous improvement of Six Sigma program.

Considering these requirements, the researcher would like to propose the following research goals for this study.

First, the researcher propose proper factors/influencers (or constructs) that will make six sigma management activities statistically significant.

Second, by constructing a conceptual model among the appropriate factors, the researcher statistically analyze the effects of six sigma management activities on Multi-specialty hospitals.

Third, based on the statistically analysis results, researcher will establish the practical significance of six sigma management activities which will be beneficial to the society at large.

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